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PROBLEMS FOR SOLUTION.

ARITHMETIC.

100. Proposed by CHARLES C. CROSS, Libertytown, Md.

I bought stock at 4% discount, and sold it at 2½% premium, paying a brokerage in both cases of ¼%. If my net profits were $130, what was my investment? (Solve by Arithmetic.)

101. Proposed by F. P. MATZ, Sc. D., Ph. D., Professor of Mathematics and Astronomy in Irving College, Mechanicsburg, Pa.

A man gained $m=3\%$ on his money, in July; and, in August, lost $n=2\%$. What per cent. of his money July 1st is his money September 1st?

⁂ Solutions of these problems should be sent to B. F. Finkel, not later than November 10.

ALGEBRA.

89. Proposed by G. A. MILLER, Ph. D., Instructor in Mathematics, Cornell University, Ithaca, N. Y.

Solve by quadratics.,

$$x^2+y=7\ldots\ldots(1).$$
$$x+y^2=11\ldots\ldots(2).$$

⁂ Solutions of this problem should be sent to J. M. Colaw, not later than November 10.

GEOMETRY.

102. Proposed by B. F. FINKEL, A. M., M. Sc., Professor of Mathematics and Physics, Drury College, Springfield, Mo.

Ohne Benutzung des Cirkels eine Strecke AC zu halbiren, wenn eine Parallele der Geraden AC gegeben ist. [*Reye's Geometrie der Lage*, Part I, p. 191.]

103. Proposed by FREMONT CRANE, Sand Coulee, Mont.

A horse is tethered with a rope which is attached to a stake B on the edge of a circular pond containing one acre. How long must the rope be to allow the horse to graze over one acre? [From *Home Study Magazine*, problem 249.]

104. Proposed by SAMUEL E. HARWOOD, M. A., Professor of Mathematics, Southern Illinois State Normal University, Carbondale, Ill.

To find a point in the circumference of a semi-circumference such that the sum of its distances from the extremites of the diameter shall be a maximum. [From *Wentworth's Plane Geometry*, Ex. 387.]

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CALCULUS.

80. Proposed by B. F. FINKEL, A. M., M. Sc., Professor of Mathematics and Physics, Drury College, Springfield, Mo.

A vessel is anchored in three fathoms of water, and the cable passes over a sheave in the bowsprit, which is six feet above the water. If the cable is hauled in at the rate of a foot a second, how fast is the vessel moving through the water when there is five fathoms of cable out? What is the acceleration of the vessel's velocity? [From *Byerly's Problems in Differential Calculus.*] ANS.—(a) 5/6 feet per second; (b)12/121 feet per second. Are these results correct?

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MECHANICS.

73. **Proposed by J. K. ELLWOOD, A. M., Principal of Colfax Schools, Pittsburg, Pa.**

A sixteen-foot plank weighs thirty-two pounds and is supported by two props, four feet and two feet from the ends. What weight is supported by each prop?

74. **Proposed by B. F. FINKEL, A. M., M. Sc., Professor of Mathematics and Physics, Drury College, Springfield, Mo.**

In the experiment of swinging in a vertical circle a glass containing water, and suspended by means of a string, if the string be two feet long, what must be the velocity at the lowest point if the experiment is to succeed? [From *Ziwet's Theoretical Mechanics*, Part III., p. 96.]

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AVERAGE AND PROBABILITY.

69. **Proposed by Rev. W. ALLEN WHITWORTH, M. A.**

There are n equal sugar sticks. Each stick is broken into two pieces, all positions of the fracture being equally likely. Of the two n pieces thus formed, a child is to take the largest. Show that his expectation is $[2n+1]/[2(n+1)]$ of a stick. [From *The Educational Times*, June, 1898.]

70. **Proposed by Professor MILLER.**

A ship at A observes another at B, whose course is unknown. Supposing their speed the same, prove that the chance of their coming within a given distance, d, of each other is always $(2/\pi)\sin^{-1}(d/a)$, whatever the course taken by A; provided its inclination to AB is not greater than $\cos^{-1}(d/a)$, where $AB=a$.

[From *Cambridge Mathematical Tripos*, 1871.]

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